A Novel Electron Energy Analyser for both Surface and Bulk Sensitive Photoelectron Spectroscopy up to 15 keV Kinetic Energy

M. Merkel[1], M. Escher[1], J.R. Rubio-Zuazo[2], G.R. Castro[2]

[1]Focus GmbH, Neukirchner Str. 2, D-65510 Hünstetten, Germany
[2] SpLine, Spanish CRG beamline at the European Synchrotron Radiation Facility, 6 rue Jules Horowitz - B.P. 220, F-38043 Grenoble CEDEX 09, France

Responding to the growing interest in Hard X-ray Photoelectron Spectroscopy (HAXPES) by the scientific community a number of both academic and commercial projects dedicated to the development of suitable instruments have been realized [1]. The majority of the different instruments developed up to now are operated typically at kinetic energies between about 6 and 8 keV. We developed the first commercially available analyser that is today routinely operated with electrons up to 15 keV kinetic energy. In terms of the maximum bulk sensitivity of the electrons detected by this analyser we achieve at least twice of the escape depth compared to 6 keV. The HV-CSA (High Voltage Cylinder Sector Analyser) is based on a cylinder sector [2] with a 90° deflection, 300 mm slit-to-slit distance and an entrance zoom lens with 50 mm sample distance. The result is a very compact design of an analyser that is easily integrated into existing multi purpose experiments with different techniques. A low noise / low drift electronics is capable of continuous energy scans from 0 to 15 keV applying non-linear lens curves. The first analyser has been recently installed at the Spanish CRG beamline SPLINE at the ESRF (Grenoble, France) at an end station where simultaneous surface X-ray diffraction is possible [3].

We will show the electron optical philosophy and layout of the analyser together with a detailed description of the dedicated electronics that we developed.

Both first laboratory and synchrotron results will be shown at the same workshop by our scientific colleagues of the SpLine (ESRF) crew.

References:

[1] Proceedings of 1st HAXPES workshop 2003 in Nucl. Instrum. A, 547 (2005) 1-238
[2] J. Risley, Rev. Sci. Instrum. 43 (1972) 95
[3] J.R. Rubio-Zuazo, G.R. Castro, Nucl. Instrum. A, 547 (2005) 64-72